

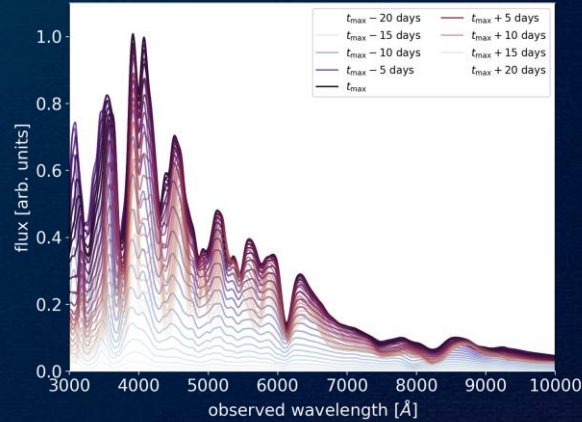
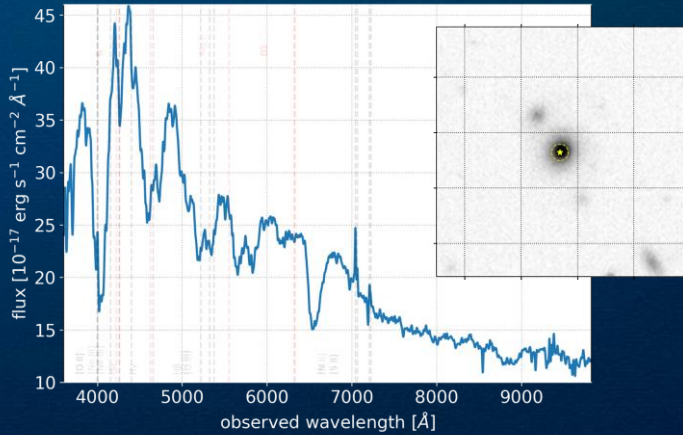
Serendipitous ID of Transients in Spectroscopic Data

Segev BenZvi, AJ LaBarca, Yang Zhang & many others – Department of Physics & Astronomy, University of Rochester



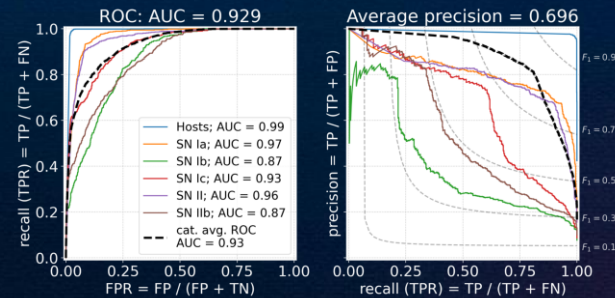
Motivation: most transients (~90%) have no spectroscopic follow-up. Catch some “in the act!”

Challenges: rarity (surface densities $\sim 10^{-2}$ deg $^{-2}$), diversity + spectral evolution, huge data sets ($\sim 10^7$ spectra), impact on host redshift fitting.



Approach:
- supervised learning using diverse spectral templates

Complements the unsupervised learning of outliers & anomalies.



| | Hosts | SN Ia | SN Ib | SN Ic | SN II | SN IIb |
|--------|-----------------|----------------|---------------|----------------|----------------|----------------|
| Hosts | 0.998 (1986) | 0.000 (0) | 0.000 (0) | 0.000 (0) | 0.002 (3) | 0.000 (0) |
| SN Ia | 0.016 (12) | 0.934 (690) | 0.003 (2) | 0.008 (6) | 0.028 (21) | 0.011 (8) |
| SN Ib | 0.056 (20) | 0.403 (145) | 0.208 (75) | 0.142 (51) | 0.153 (55) | 0.039 (14) |
| SN Ic | 0.079 (32) | 0.175 (71) | 0.017 (7) | 0.584 (237) | 0.128 (52) | 0.017 (7) |
| SN II | 0.028 (20) | 0.054 (39) | 0.000 (0) | 0.012 (9) | 0.900 (654) | 0.007 (5) |
| SN IIb | 0.034 (16) | 0.183 (86) | 0.026 (12) | 0.028 (13) | 0.391 (184) | 0.338 (159) |

Transformer with no de-redshifting.

Conversion to a binary classifier...

